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| EXAMINER | |
|---|---|
| LEE, GINA W | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/698,629 | BOSSEMEYER ET AL. | |
| | Examiner | Art Unit | |
| | Gina W. Lee | 2626 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *21 October 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-8, 10-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8 and 10-20* is/are rejected.

7)☒ Claim(s) *17-20* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 October 2007* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Response to Amendment*

1. In response to the office action from 7/20/2007, Applicant has submitted an amendment, filed 10/21/2007, amending claims 1, 10, 17, and 20, cancelling claim 9, and arguing to traverse the art rejection based on the limitation regarding adjusting boundaries of one of an adjacent pair of glottal events to minimize the pair-wise distance between the first and second glottal events *(Amendment, page 9)*. The Applicant's arguments have been fully considered, but they are moot in view of the new grounds of rejection and do not place the claims in condition for allowance.

2. The previous objections directed to Applicant's disclosure have been withdrawn by the examiner.

### *Change of Art Units*

3. Please note that the examiner has changed art units, which was formerly 2609. The examiner's new art unit is 2626.

### *Response to Arguments*

4. Applicant's arguments filed 10/21/2007 have been considered but are moot in view of the new ground(s) of rejection.

### *Claim Objections*

5. **Claim 17** is objected to because of the following informalities:

- The terminology used in the claim is confusing. In previous claims, the earlier-occurring glottal event in a pair of glottal events is referred to as a first glottal event, and the later-occurring glottal event is called a second glottal event. In this claim the terms "first glottal events" and "second glottal events" appear to refer to different sets of glottal events which are extracted from speech which was recorded at different times.
- The terminology used in the claim is indefinite. In the amended section of the claim, reference is made to "each adjacent pair of the glottal events", which could refer to pairs of glottal events from the set of glottal events extracted from the earlier-recorded speech, or pairs of glottal events from the set of glottal events extracted from the later-recorded speech.
- In addition, reference is made to a "leading glottal event" and a "lagging glottal event". There is uncertainty regarding which set of glottal events this refers to (see above paragraph), but in the event that this refers to the second set of glottal events, it is possible that these terms refer to the same glottal events as the previously-used terms "second glottal event" and "adjacent second glottal events". If this is the case, using four different terms to refer to two glottal events is confusing.
- The amended section of the claim also refers to "the glottal events **within each speech segment**". There is ambiguity about what this phrase refers to, as this is the first mention in the claim of any speech segments.
- The amended section of the claim begins with the phrase "wherein the mechanism is to..." and appears to attempt to clarify the function of the mechanism. However, since the mechanism appears to have multiple functions including generating glottal events,

confirming glottal events by registering glottal events with other glottal events, comparing glottal events, and determining matches, it is unclear which of these the amended section is endeavoring to further explicate.

Appropriate correction is required.

6. **Claims 18 and 19** are also objected to because they are dependent on claim 17.

7. **Claim 18** is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Although the claim appears to be a functional limitation, in that it further limits the mechanism's confirming function by specifying an action it performs (accuracy of determining the speaker match is improved), this definition is not specific, and does not change the structures or functions of claim 17. Applicant is required to cancel the claim, or amend the claim to place the claim in proper dependent form, or rewrite the claim in independent form.

8. **Claim 20** is objected to because of the following informalities:

- The terminology used in the claim is confusing. In previous claims, the earlier-occurring glottal event in a pair of glottal events is referred to as a first glottal event, and the later-occurring glottal event is called a second glottal event. In this claim the terms "first glottal events" and "second glottal events" appear to refer to different sets of glottal events which are extracted from speech which was recorded at different times.

- The terminology used in the claim is indefinite. In the amended section of the claim, reference is made to "each adjacent pair of the glottal events", which could refer to pairs of glottal events from the set of glottal events extracted from the earlier-recorded speech, or pairs of glottal events from the set of glottal events extracted from the later-recorded speech.
- In addition, reference is made to a "leading glottal event" and a "lagging glottal event". There is uncertainty regarding which set of glottal events this refers to (see above paragraph), but in the event that this refers to the second set of glottal events, it is possible that these terms refer to the same glottal events as the previously-used terms "second glottal event" and "adjacent second glottal events". If this is the case, using four different terms to refer to two glottal events is confusing.
- The amended section of the claim appears to add information of patentable weight to the claim, but as it only refers to a "means" it is not clear which earlier means of the claim this section is meant to expand upon.

Appropriate correction is required.

### *Claim Rejections - 35 USC § 101*

9. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

10. Claims 1-8 are rejected under 35 U.S.C. 101 because the claimed invention lacks patentable utility.

11. With respect to **independent claim 1**, while the claimed invention falls within a statutory category of invention because it is a process (a series of acts to be performed), it does not produce a useful, tangible, and concrete result. The claim merely describes a method of manipulating a speech signal and does not claim any steps of storing any results, labeling or associating the results with any other data, comparing the signal to a reference signal for the purposes of speaker verification, or any other steps which would imply a specific use for the speech signal data. Therefore, the claim as it currently stands does not have patentable utility.

12. With respect to **claims 2-8**, these claims are dependent upon claim 1, and do not contain any additional step that would accord utility to any of the dependent claims.

***Claim Rejections - 35 USC § 103***

13. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

14. Claims 1-8 and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kametani (US 5,091,948) in view of Prezas (US 4,561,102) and further in view of "Method for the Segmentation of Voiced Speech Signals into Pitch Period Segments" by Radová et al., hereinafter referred to as Radová.

15. With respect to **independent claim 1**, Kametani teaches a method comprising:

- receiving a signal representing digitized, sampled human speech *(column 2, lines 42-50, A/D converter digitizes the analog waveform at a particular sampling rate)*;
- locating at least one speech segment within the signal *(Fig 2, column 2, line 51-column 3, line 5, voiced speech is located)*; and
- locating one or more higher energy sections within each speech segment within the signal *(Fig 2, column 2, line 51-column 3, line 5, voiced speech is located)*

However, Kametani does not teach the method of pitch detection.

In the same field of endeavor, Prezas teaches a method comprising:

- locating a plurality of glottal events within each speech segment within the signal, based on the one or more higher energy sections within each speech segment *(Fig. 4, column 4, lines 59 – col. 5, line 50, pulses are measured and their locations recorded)*; and,
- confirming the plurality of glottal events located within each speech segment within the signal, including registering each of at least one of the plurality of glottal events with adjacent glottal events *(Fig. 4, column 6, line 24-column 7, line 14, pulses are placed in order of occurrence and the interval between them is measured and recorded)*

However, Prezas alone does not teach the method of comparing and adjusting the boundaries of the glottal events.

In the same field of endeavor, Radová teaches a method including the steps of:

- comparing a first glottal event and a second glottal event of the adjacent pair of glottal events to determine a pair-wise distance between the first and the second glottal events *(section 2.2, the distance between the segments is determined as a byproduct of the dynamic time warping (DTW) procedure)*; and

- adjusting boundaries of at least one of the first glottal event and the second glottal event to minimize the pair-wise distance between the first and the second glottal events, maximizing similarity of the first and the second glottal events of the adjacent pair, such that adjusting the boundaries of at least one of the first glottal event and the second glottal event results in the pair-wise distance between the first and the second glottal events being minimized *(section 2.2, segments are aligned using the dynamic time warping (DTW) procedure, the distance between them is determined, and similarity correction to the lengths is made for which the distance is minimal).*

Kametani teaches a generic system for speaker verification that may use pitch as a speech features, and as Prezas teaches an accurate method of pitch detection, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kametani's system with the method of Prezas, because it would enable the system to detect pitch more quickly and accurately. The combination of Kametani and Prezas teaches a method of reliably locating glottal events, but Prezas, while allowing a margin of error in the pulse location calculation, is silent as to a method of adjusting calculations to increase the similarity between sections of the signal. Radová teaches a method for segmentation of a waveform which includes steps of comparing the segments and adjusting the boundaries by performing a dynamic time warping procedure, and further teaches that using a standardized starting point of the segmentation across all waveforms is reasonable. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of Radová to improve the speech signal system of Kametani and Prezas for the predictable result of the more accurately segmented waveform.

16. With respect to **claim 2**, Kametani in view of Prezas and further in view of Radová teaches everything claimed, as applied above *(see claim 1)*. In addition, Prezas teaches a method of receiving a signal representing digitized, sampled human speech,

- comprising sampling the human speech to digitize the human speech, yielding the signal *(Fig. 1, column 4, lines 8-9, coder (11) samples speech and digitizes the sample amplitudes)*.

While Prezas does not explicitly state so, it would have been obvious to one of ordinary skill in the art that the speech source (10) may also be speech that as been previously recorded, as the nature of the speech source does not affect Prezas's invention.

17. With respect to **claims 3 and 4**, Kametani in view of Prezas and further in view of Radová teaches everything claimed, as applied above *(see claim 1)*. In addition, Kametani teaches a method of locating a speech segment within the signal comprising:

- determining a start point and an end point of each speech segment by determining an energy within the signal and examining the energy for regions above a threshold *(Fig 2, column 2, line 51-column 3, line 5, voiced speech is located)*.

18. With respect to **claim 5**, Kametani in view of Prezas and further in view of Radová teaches everything claimed, as applied above *(see claim 1)*. In addition, Kametani teaches a method of locating a higher energy section comprising:

- determining regions within each speech segment where an energy is at least a percentage of a peak energy with in the speech segment *(Fig 2, column 2, line 51-column 3, line 5, voiced speech is located)*.

19. With respect to **claim 6**, Kametani in view of Prezas and further in view of Radová teaches everything claimed, as applied above *(see claim 1)*. In addition, Prezas teaches a method of locating a plurality of glottal events comprising:

- subjecting each higher energy section within the speech segment to a linear predictive coefficient (LPC) analysis, yielding a LPC residual error signal for each higher energy section *(column 4, lines 15-33, LPC analysis is performed and a residual signal is created)*;
- locating a number of largest peaks within the LPC residual error signal for each higher energy section that have a minimum separation between adjacent of the peaks *(column 4, line 64-column 5, line 3, amplitudes of the peaks are measured in order of decreasing height and stored in the pulse amplitude storage (48). Locations are stored in the pulse location storage (49))*; and
- locating the plurality of glottal events within the speech segment as corresponding to the number of largest peaks within the LPC residual error signal that have the minimum separation *(column 5, lines 13-18, pulses that are closer than a minimum separation are eliminated from consideration)*.

20. With respect to **claim 7**, Kametani in view of Prezas and further in view of Radová teaches everything claimed, as applied above *(see claim 6)*. In addition, Prezas teaches a method of subjecting a higher energy section to LPC analysis, yielding the LPC residual error signal, comprising:

- determining the LPC residual error signal as the square of the difference between the higher energy section and an LPC-derived model of the higher energy section *(column 4, lines 10-13, samples of the LPC model are combined with each actual sample to find the best least square fit)*.

21. With respect to **claim 8**, Kametani in view of Prezas and further in view of Radová teaches everything claimed, as applied above *(see claim 6)*. In addition, Prezas teaches a method of locating the number of largest peaks within the LPC residual error signal that have the minimum separation between adjacent of the peaks comprising:

- from all the largest peaks within the LPC residual error signal, removing those peaks that lack the minimum separation between adjacent of the peaks *(column 5, lines 13-18, pulses that are closer than a minimum separation are eliminated from consideration)*.

22. With respect to independent **claim 17**, Kametani teaches a speaker verification system comprising:

- a computer-readable medium having stored thereon a plurality of events extracted from previously recorded human speech *(Fig 1, column 5, lines 17-23, pattern memory (43) containing reference parameters)*;

- a recording device to record further human speech and store a signal representing the further human speech on the computer-readable medium *(Fig 1, column 2, lines 38-50 and column 3, microphone (1) receives human speech and provides the digitized signal to a buffer (10) in memory)*; and
- a mechanism to compare a plurality of events with a plurality of stored events to determine whether the further human speech recorded matches the previously recorded human speech *(Fig. 1, column 5, lines 12-35, features are compared to make a decision that a voice matches a corresponding pattern)*

but does not teach any method of generating or adjusting glottal events.

In the same field of endeavor, Prezas teaches a method:

- to generate a plurality of second glottal events from the signal *(Fig. 4, column 4, lines 59 – col. 5, line 50, pulses are measured and their locations recorded)*,
- to confirm the plurality of second glottal events by registering each second glottal event with adjacent second glottal events *(Fig. 4, column 6, line 24-column 7, line 14, pulses are placed in order of occurrence and the interval between them is measured and recorded)*

but does not teach the method of comparing and adjusting the boundaries of glottal events.

In the same field of endeavor, Radová teaches a method for each adjacent pair of the glottal events within a speech segment including the step of:

- adjusting boundaries of at least one of the leading glottal event and the lagging glottal event to minimize a pair-wise distance between the leading and the lagging glottal events, maximizing similarity of the leading and the lagging glottal events of the adjacent pair,

such that adjusting the boundaries of at least one of the leading glottal event and the lagging glottal event results in the pair-wise distance between the leading and the lagging glottal events being minimized *(section 2.2, segments are aligned using the dynamic time warping (DTW) procedure, the distance between them is determined, and similarity correction to the lengths is made for which the distance is minimal).*

Kametani teaches a generic system for speaker recognition that may use pitch as a speech feature for identification, and Prezas teaches a method of locating glottal events to find the pitch. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kametani's system with the method of Prezas for the predictable result of improving the pitch detection function. Kametani and Prezas together then teach a speaker recognition system that can locate glottal events. Radová teaches a method of segmenting a speech signal and adjusting the boundaries between glottal events, in order to use the segmented speech data in a voice recognition system *(section 1, Introduction)*. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to implement Radová's technique of speaker recognition in the speaker recognition system of Kametani and Prezas for the predictable result of a speaker recognition system that evaluates the similarity of pitch-period-length segmented waveforms to make the speaker identification decision.

23. With respect to **claim 18**, Kametani in view of Prezas and further in view of Radová teaches everything claimed, as applied above *(see claim 17)*. In addition, Radová teaches a method for confirming the plurality of second glottal events by registering each second glottal

event with adjacent second glottal events, which is an improved algorithm, in order to use the algorithm to recognize speakers *(section 1, Introduction)*.

24. With respect to **claim 19**, Kametani in view of Prezas and further in view of Radová teaches everything claimed, as applied above (see claim 17). In addition, Prezas teaches

- a computer program stored on the computer-readable medium *(column 5, lines 38-509, column 9, line 62-column 10, line 4, column 10, lines 40-51, Prezas's method can be implemented by a system containing memory, processors, and programmable logic)*.

25. With respect to independent **claim 20**, Kametani teaches a speaker verification system comprising:

- first means for recording human speech and for storing a signal representing the human speech on a computer-readable medium *(Fig 1, column 2, lines 38-50 and column 3, microphone (1) receives human speech and provides the digitized signal to a buffer (10) in memory)* having previously stored thereon a plurality of events extracted from previously recorded human speech *(Fig 1, column 5, lines 17-23, pattern memory (43) containing reference parameters)*;
- a means for comparing the plurality of events with the plurality of previously-recorded events to determine whether the further human speech recorded matches the previously recorded human speech *(Fig. 1, column 5, lines 12-35, features are compared to make a decision that a voice matches a corresponding pattern)*

but does not teach a method of generating glottal events.

In the same field of endeavor, Prezas teaches a:

- second means for generating a plurality of glottal events from the signal *(Fig. 4, column 4, lines 59 – col. 5, line 50, pulses are measured and their locations recorded)*, for confirming the plurality of second glottal events by registering each glottal event with adjacent glottal events *(Fig. 4, column 6, line 24-column 7, line 14, pulses are placed in order of occurrence and the interval between them is measured and recorded)*

but does not teach any method of adjusting the boundaries of the glottal events.

In the same field of endeavor, Radová teaches a method for each adjacent pair of the glottal events to:

- adjust boundaries of at least one of the leading glottal event and the lagging glottal event to minimize a pair-wise distance between the leading and the lagging glottal events, maximizing similarity of the leading and the lagging glottal events of the adjacent pair, such that adjusting the boundaries of at least one of the leading glottal event and the lagging glottal event results in the pair-wise distance between the leading and the lagging glottal events being minimized *(section 2.2, segments are aligned using the dynamic time warping (DTW) procedure, the distance between them is determined, and similarity correction to the lengths is made for which the distance is minimal. The best similarity correction results in the minimum distance between the segments.)*.

Kametani teaches a system for speaker recognition that may use pitch as a speech feature for identification, and Prezas teaches a method of locating glottal events to find the pitch. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kametani's system with the method of Prezas for the predictable result of improving the

pitch detection function. Kametani and Prezas together then teach a speaker recognition system that can locate glottal events. Radová teaches a method of segmenting a speech signal and adjusting the boundaries between glottal events, in order to use the segmented speech data in a voice recognition system *(section 1, Introduction)*. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to implement Radová's technique of speaker recognition in the speaker recognition system of Kametani and Prezas for the predictable result of a speaker recognition system that evaluates the similarity of pitch-period-length segmented waveforms to make the speaker identification decision.

26. Claims 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Method for the Segmentation of Voiced Speech Signals into Pitch Period Segments" by Radová et al., hereinafter referred to as Radová.

27. With respect to independent **claim 10**, Radová teaches a method for a speaker identification system *(section 1, Introduction)*, comprising, for each adjacent pair of glottal events within each of a plurality of speech segments within a signal representing digitized, sampled human speech:

- comparing a first glottal event and a second glottal event of the adjacent pair of glottal events to determine a pair-wise distance between the first and the second glottal events *(section 2.2, the distance between the segments is determined as a byproduct of the dynamic time warping (DTW) procedure)*; and,

- adjusting boundaries of at least one of the first glottal event and the second glottal event to minimize the pair-wise distance between the first and the second glottal events, such that adjusting the boundaries of at least one of the first glottal event and the second glottal event results in the pair-wise distance between the first and the second glottal events being minimized *(section 2.2, segments are aligned using the dynamic time warping (DTW) procedure, the distance between them is determined, and similarity correction to the lengths is made for which the distance is minimal)*,

Although Radová does not explicitly state using a computer, it would have been obvious to one of ordinary skill in the art that a signal processing algorithm including a dynamic time warping procedure would be implemented using a computer.

28. With respect to **claim 11**, Radová teaches everything claimed, as applied above *(see claim 10)*. In addition, Radová teaches

- adjusting the boundaries of at least one of the first glottal event and the second glottal event comprises adjusting at least one of a start point and an end point of at least one of the first glottal event and the second glottal event *(section 2.2, the distance between segments is determined, and the lengths of the segments are corrected; the best correction is a correction for which the distance between the two segments is minimal.)*.

29. With respect to **claim 12**, Radová teaches everything claimed, as applied above *(see claim 10)*. In addition, Radová teaches

- adjusting the boundaries of at least one of the first glottal event and the second glottal event maximizes similarity of the first and the second glottal events *(section 2.2, the distance between segments is determined, and the lengths of the segments are corrected; the best correction is a correction for which the distance between the two segments is minimal.)*.

30. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Method for the Segmentation of Voiced Speech Signals into Pitch Period Segments" by Radová et al., hereinafter referred to as Radová, as applied to claim 10 above, and further in view of Prezas (US 4,561,102).

31. With respect to **claim 13**, Radová teaches everything claimed, as applied above *(see claim 10)*, and additionally discusses the need for defining the synchronized starting point across the waveforms *(section 2.1)*, but does not explicitly teach a method of initially locating a plurality of glottal events within each speech segment within the signal. However, the examiner contends that this concept was well known in the art, as taught by Prezas.

In the same field of endeavor, Prezas teaches a method to measure and record the locations of pulses *(col. 4, lines 59 – col. 5, line 50)*.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the known technique of locating the glottal pulses, as taught by Prezas, to the method of comparing and adjusting the glottal events, as taught by Radová, for the

predictable result of applying the segmentation algorithm using the provided glottal pulse locations.

32. With respect to **claim 14**, Radová in view of Prezas teaches everything claimed, as applied above *(see claim 13)*. In addition, Prezas teaches:

- subjecting each of a plurality of higher energy sections within the speech segment to a linear predictive coefficient (LPC) analysis, yielding a LPC residual error signal for each higher energy section *(column 4, lines 15-33, LPC analysis is performed and a residual signal is created)*;
- locating a number of largest peaks within the LPC residual error signal for each higher energy section that have a minimum separation between adjacent of the peaks *(column 4, line 64-column 5, line 3, amplitudes of the peaks are measured in order of decreasing height and stored in the pulse amplitude storage (48). Locations are stored in the pulse location storage (49))*;
- locating the plurality of glottal events within the speech segment as corresponding to the number of largest peaks within the LPC residual error signal that have the minimum separation *(column 5, lines 13-18, pulses that are closer than a minimum separation are eliminated from consideration)*;
- removing any of the plurality of glottal events within the speech segment that have a zero crossing rate greater than a threshold rate *(column 5, lines 13-18, pulses that are closer than a minimum separation are eliminated from consideration)*; and,

- removing any of the plurality of glottal events within the speech segment that have a duration outside of a threshold pitch interval range *(Fig. 5, column 6, lines 40-54, pulse not within a corresponding pitch range of another pulse is eliminated).*

33. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Method for the Segmentation of Voiced Speech Signals into Pitch Period Segments" by Radová et al., hereinafter referred to as Radová, in view of Prezas (US 4,561,102), as applied to claim 13 above, and further in view of Kametani (US 5,091,948).

34. With respect to **claim 15**, Radová in view of Prezas teaches everything claimed, as applied above *(see claim 13)*. However, although Prezas teaches locating glottal events from speech, Radová in view of Prezas does not explicitly teach first locating the speech segments in the signal or locating higher energy sections within each speech segment. However, the examiner contends that these concepts were well known in the art, as taught by Kametani.

In the same field of endeavor, Kametani teaches locating voiced speech in the speech signal *(Fig. 2, column 2, line 51-column 3, line 5).*

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the known technique of locating the speech in the signal, as taught by Kametani, to the method of locating the glottal events in the speech, as taught by Prezas, for the predictable result of eliminating the sections of the signal that do not contain speech from consideration.

35. With respect to **claim 16**, Radová in view of Prezas and further in view of Kametani teaches everything claimed, as applied above *(see claim 15)*. In addition, Kametani teaches receiving a signal *(column 2, lines 42-50, A/D converter digitizes an input analog waveform at a particular sampling rate)*.

***Conclusion***

36. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gina W. Lee whose telephone number is (571) 270-3139. The examiner can normally be reached on Monday to Friday, 8:00 AM - 5:00 PM EST.

37. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Edouard can be reached on (571) 272-7603. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

38. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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